The University of Minnesota

AGRICULTURAL EXTENSION DIVISION

Special Bulletin No. 10

University Farm, St. Paul August 1916

Published by the University of Minnesota, College of Agriculture, Extension Division, A. D. Wilson, Director, and distributed in furtherance of the purposes of the coöperative agricultural extension work provided for in the Act of Congress of May 8, 1914.

TREE-PLANTING IN MINNESOTA

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This booklet is an answer to the many questions received in regard to the choice of species, size of stock, time and method of planting forest trees, and especially of evergreens. Observations in the treeless sections of the state have shown that a large percentage of the failures of plantations have been due to poor nursery stock and unskillful handling of small trees. There is probably no section of the state, with the exception of small patches of strong alkali soil, which will not support some species of trees. All that is necessary is the selection of proper species, the proper handling of the stock, and the proper cultivation of the plantation during the first few years.

Choice of Species

There is a great difference between selecting the right species for a grove or windbreak, and for ornamental planting. In the latter case, only a few trees are planted. They are located close to the house, their small number makes greater individual care possible, and their loss involves very little labor or expense. Under these conditions, more experimental planting is permissible, and a much wider choice of species is possible. In the case of a grove or windbreak, which involves a larger number of trees and consequently considerable labor and expense, no such range of choice is permissible. The species must be absolutely hardy, capable of thriving under hard conditions, and well suited to the purpose in hand. With these points in mind, this booklet will deal only with those species which have proved themselves generally successful. There are other species which may be successful under some conditions, but they are too uncertain to receive unqualified endorsement. They should be planted only after consulting the College of Forestry or the State Forester, who will advise as to the probability of success in planting the species and the proper method and manner of planting.

For the first planting on the treeless prairies, where the chief consideration is hardiness and rapid growth, there is nothing better than the white willow or the cottonwood. There is very little choice between the common cottonwood and the Carolina or the Norway poplars, except that the first may spread "cotton" in the spring if the female tree is planted. In this booklet the term cottonwood will be used to apply to all three. These species, though some-

times indispensable at the start, are not good for a permanent grove or windbreak. They are rather short-lived, incapable of growing in dense stands for any great length of time and therefore unable to keep out the weeds and grass. Their duty is to form the first quick protection for other more desirable species. This first duty performed, they should be replaced or mixed with other species. Of the two, the cottonwood produces the better product and grows better in mixture with other species.

For permanent species in mixture with the cottonwood or willow, or behind their protection, the green ash and the American elm are the most satisfactory. Both are sturdy trees, long lived and well shaped. The elm is the faster grower; the ash produces a little the better timber.

For a windbreak or in mixture with the cottonwood or ash, nothing is better than the white spruce. Being an evergreen it holds its needles over winter, presents a solid wall to the wind, winter and summer, and looks well the year round. Its ability to stand shade makes it possible to maintain it in very dense stands, or under the ash and cottonwood, and to keep the limbs growing well down to the ground in the open. Its growth is fair and the timber valuable. It will grow on almost any soil, but grows slowly on very poor land.

Of more rapid growth and equally valuable for grove planting is the Scotch pine. It will grow well on a lighter, drier, sandier soil than the spruce and produces a valuable wood for fuel and lumber. On account of its more rapid growth, it is not so good as the spruce in a windbreak, but does admirably in mixture with the spruce.

In the southern part of the state the Norway spruce may be substituted for the white, and in some of the heavier clay soils the Colorado blue spruce may be better than either. The Norway is a more rapid grower, but requires a warmer climate and a better soil for its best development.

From this assortment of trees, a satisfactory plantation can be made in any situation in the state and with the proper care its success will be pretty well assured.

Planting Stock

It is not often advisable for the farmer to try to grow trees from seed. Stock of the class and size hereafter described should be bought from some reliable nursery.

Season for Planting

Planting may be done in the fall after growth has ceased, but is less certain than spring planting on account of the increased danger of heaving by frost. The best time for the planting of all species is in the spring from the time the frost is thoroly out of the ground until the stock has started to grow. Later planting is very uncertain.

When to Order

It must be remembered that spring is a very busy time at the nurseries and late orders receive scant attention. The time to order stock is in the winter so that the nursery will have plenty of time to plan and arrange for the shipment. In placing the order, specify the date when the stock is to be delivered. Make that date the time when the frost ordinarily goes out of the ground, or have them hold the stock until notified to deliver it. Most shipments are made by express.

What to Order

It is very important to order the right size and class of stock.

Willow and cottonwood.—Willow and cottonwood can be very successfully grown by means of cuttings, which should be at least ten inches long and half an inch in diameter. They can be bought by the hundred, but like all other nursery stock they are much cheaper by the thousand. The prices are very reasonable.

These species can also be bought as one-year-old seedlings or rooted cuttings and are more sure than the unrooted cuttings, but with the exception of very adverse conditions the increased cost of the stock and the greater labor required for planting make the cuttings preferable.

Green ash and American elm.—Green ash and American (white) elm should be bought as one-year-old seedlings. Larger plants are desirable for ornamental plantings, but too expensive for general use. This stock should be from six inches to two feet high and have a good root development. The number of the roots is much more important than the development of the top.

White spruce and Scotch pine.—No evergreens should be planted in their permanent site in the prairie section except as transplants. There are two ways in which this stock can be secured.

1. Buy the transplants directly from the nursery. This stock should be three or four years old and from six to sixteen inches high. The pine will be considerably taller than the spruce at this age. The roots should be heavy and bunched, with many small rootlets. This method of buying saves some care and labor, but is not economical unless the transplants can be bought for $8 per thousand or less.

2. Buy two-year-old seedlings from the nursery and plant them out in transplant beds for a year or two. These plants will be from four to six inches tall only, much less stocky than the transplants, and will have fewer roots. They are not strong enough to compete with adverse conditions, such as lack of moisture, crowding by grass, and exposure to strong winds, but will grow in a well-prepared bed where they receive the proper care. They can usually be bought for less than half the cost of the transplants and make better planting-stock because they are not weakened by long packing just before they are planted in their permanent location.

Preparation of Soil

Planting should never be done on newly plowed sod land. The ground should always be thoroly plowed the year before and will be in much better condition for tree planting if a cultivated crop, as potatoes or corn, has been grown there. It is usually a waste of stock to plant in newly plowed, unrotted sod.

Where to Plant

The woodlot.—The location of the woodlot should be determined in most cases by the soil. Trees will grow satisfactorily on poorer soil than other crops. Very often soils that will not produce a paying crop of grain will grow a good crop of trees, and these otherwise valueless lands will become productive. On the ideal farm, every acre of land is devoted to the crop best adapted to it. This is seldom practicable in its entirety on account of the requirements of the business management, but there is no reason why the land unsuited to other crops should not be used for trees.

If the land is of uniform quality all over the farm, the woodlot should be where it will be most convenient, and will fit best into the general plan of the farm. No matter how valuable the land is, it will usually be found profitable to have at least a small woodlot and the less timber there is in the community the more valuable the woodlot will be. In many instances woodlots on prairie farms have proved to be, acre for acre, the best paying crop on the farm.

The windbreak serves two distinct objects: it wards off the cold winds of winter; and tempers the hot, dry winds of summer. For the former purpose it should be placed on the north side of the buildings, barnyards, and orchards; for the latter, it is most valuable on the south side of grain fields. The cold winds of winter which injure the orchards and bring discomfort to the home and livestock are mostly from the northwest; and the hot winds of summer that dry up the grain crops are from the southwest. Hence the protection is needed on the west as well as the north and south, and if the break on the north or south cannot be extended to a considerable distance west of the object to be protected, there must be an additional break on the west.

It is customary to use this west break, but the same protection can be obtained by longer breaks on the north and south, and they are less objectionable. They cast less shadow than the break running north and south and consequently do less injury to the crops adjacent to them. It has been shown that it is this shadow that injures the crops, and not the drainage of the moisture by the roots of the trees as was formerly supposed to be the case. The east and west breaks also hold the snow in place better.

In no case should the windbreak be placed less than one hundred feet from the buildings. If closer than this the snow drifts badly in the paths and drives; and extreme cases are on record where a windbreak close beside a small dwelling has caused the house to be completely buried and the roof broken in. This can be entirely avoided by locating the break one hundred feet or more from the buildings.

The windbreak was formerly considered almost solely in connection with dwelling houses and orchards. When its functions are more thoroly understood, the protection of field crops will be recognized as its most important

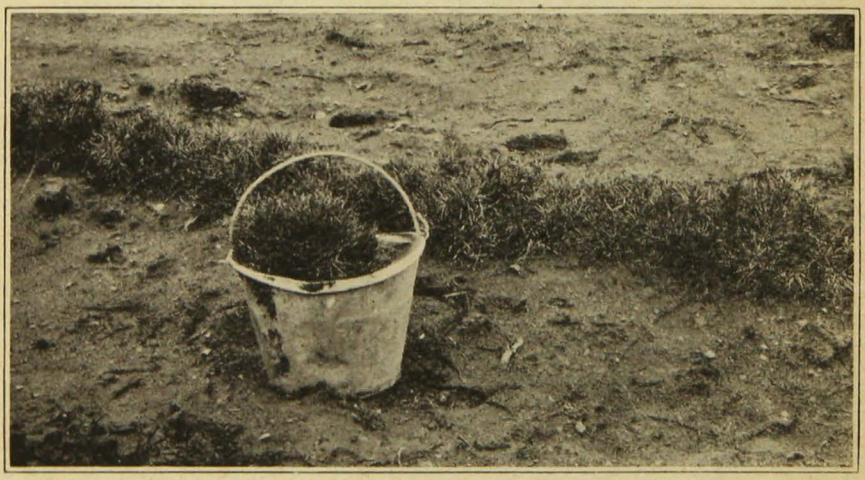


Fig. 1. Trees Ready for Planting
Some are in a bucket of water; others heeled in.

functions. The benefits from such a break are far in excess of its advantages, and the ground given up to it will produce surprisingly high returns.

Handling Stock

Cuttings.—When the cuttings arrive, they will be tied up in bundles. These bundles should immediately be taken to a root cellar, or some other shady, cool place and heeled in, that is, the lower two-thirds of them should be buried in moist soil. They can be kept in this way for several weeks if necessary, but no chance should be taken of their starting growth before they are planted. The tops should be covered with brush, hay, or burlap, which will furnish shade and protection but will not keep out the air.

The ground should be very thoroly prepared. It should be so soft that the cuttings can be thrust into the ground without any danger of peeling the bark from the lower end. The cuttings should be carried to the field in a basket or bucket covered with a wet sack. The lines should be marked with a line or marker. The cutting, held by the top, should be thrust gently into the ground until only about two inches remains above the surface. It is better to put the cutting in at a slight angle because the soil can then be more easily packed around it with the foot. In case the ground is hard or stony enough to peel the cutting when it is thrust into it, a dibble (a stick or iron slightly smaller than the cuttings) should be used to make the hole. Care should be taken not to peel or bruise the cuttings and to pack the soil firmly about them.

The rows should never be less than eight feet apart so that a horse cultivator can pass between them for several years. Willows can be planted two feet apart in a row for a windbreak. Cottonwood should not be planted closer than four feet in a row. Wider spacing is not advised.

Broad-leaved seedlings.—Green ash and elm, or any other broad-leaved seedlings should be handled the same as fruit trees. They should be heeled in like the cuttings, care being taken not to bury the tops, and they should be taken to the field in the same way. Two men can work well together on the planting, one digging the holes and the other planting the trees. The holes should be large enough to accommodate all of the roots without crowding. Then, holding the tree suspended in the hole, the soil should be filled in carefully around the roots and packed firmly. The tree should be set at about the depth it grew before it was dug up. The soil should be packed firmly by tramping. The use of manure is not advisable. The same spacing holds good here as for the cottonwood, rows eight feet apart and trees four feet apart in the row. If the top is very large, it should be pruned back.

Evergreens.—Evergreens require much greater care in handling than the broad-leaved species. The slightest drying of the roots results in the weakening, and often in the death, of the tree. The exposure of the roots to the sun usually kills them. All exposure should be avoided.

Transplants.—The stock should not be left in boxes any longer than necessary. Before unpacking, pour a bucket or two of water over it to make sure the roots are wet when exposed to the air. On removal from the box, heel the trees in immediately. Like the other stock, they can be kept in this way for several weeks if the weather is not too warm, but the sooner they are planted the better.

A rainy or cloudy day is the best for planting. Take the stock from the trench, open the bundles, and place immediately in a bucket containing enough water to cover the roots. Carry it to the field in this way. When the hole is prepared as for the ash or elm, remove a single plant from the bucket, taking

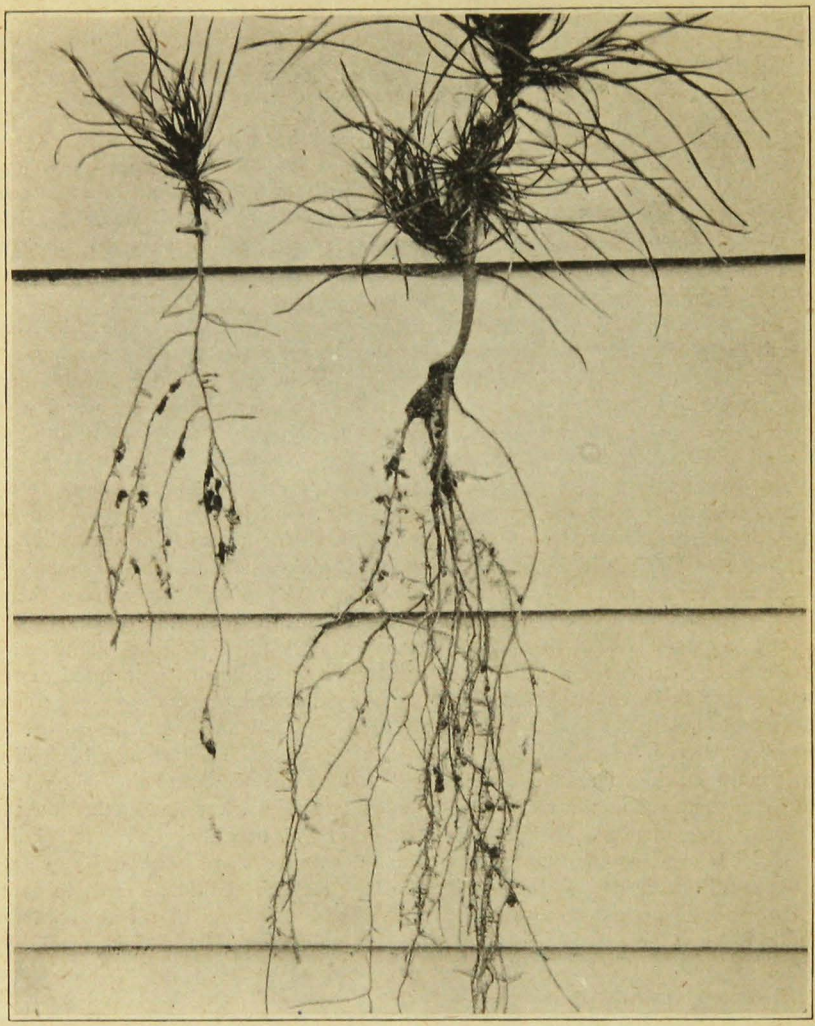


Fig. 2. Difference in Root System of a Two-year-old Seedling and a Three-year-old Transplant

care that the roots of the others are not pulled from the water in the process, and place it immediately in the hole. Fill in and pack the earth around it as before. Do not plant them too deep. Never plant evergreens in the open prairie without the protection of some other species. They should be planted back of or between the rows of the other trees. Two- or three-year-old cottonwoods will furnish sufficient protection if the evergreens are planted between the rows.

Two-year-old seedlings.—Two-year-old seedlings require the same handling as the transplants and should be heeled in in the same way. The garden is a good place for setting out these seedlings if the soil is not too heavy. Light soil is better if it contains enough fertility. No fresh manure should be used. It may burn the roots. The little seedlings can be placed in rows six inches apart and three inches apart in the rows. These rows should not be more than

four feet long or weeding will be difficult. However, the rows may be any length with a path every twelve rows.

Take the seedlings to the garden in the same way as the transplants, in a bucket containing water. Lay a six-inch board across the bed. Standing on the board, dig a trench deep enough to take care of the roots, cutting a perpendicular side along the edge of the board. Take one seedling from the bucket and hold it up against the perpendicular side at the proper depth. Press the loose dirt from the trench against the roots with the other hand. Then place another seedling in like manner three inches from it, and so on across the row. When the row is completed, fill in the trench with a hoe or rake and tramp it down firmly. Place the back of the board against this row and dig another trench in the same manner. Proceed in this way until the seedlings are planted. One man can plant from fifteen hundred to two thousand seedlings per day in this way.

These beds should be kept carefully weeded, and watered in case of a severe drouth. It is not, however, a good plan to water the beds unless they are quite dry.

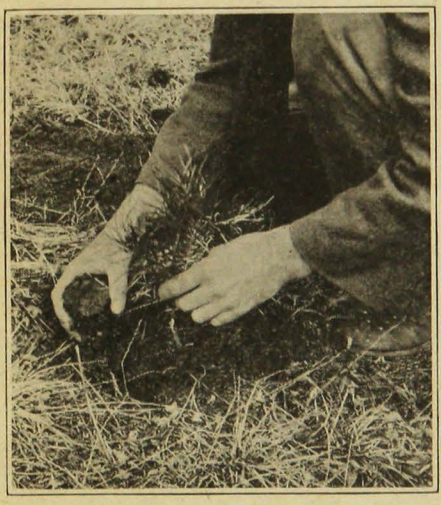


Fig. 3. Setting the Tree
Hold the tree at the same depth it was growing in the nursery, and fill in the dirt around the roots.

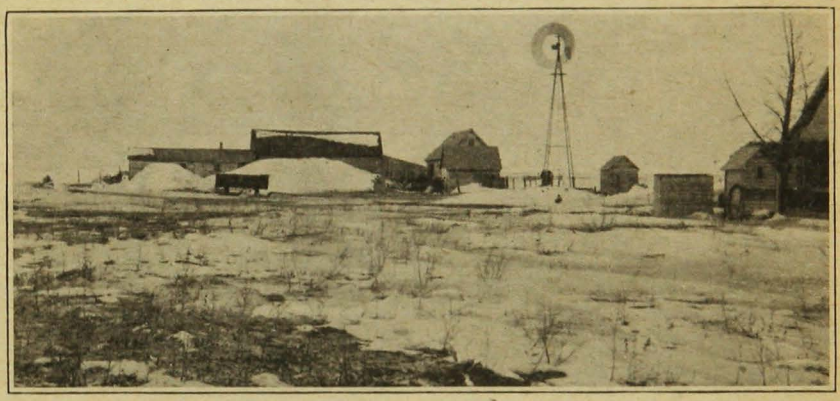
Fig. 4. Tramping
The dirt should be tramped hard around the planted seedling.

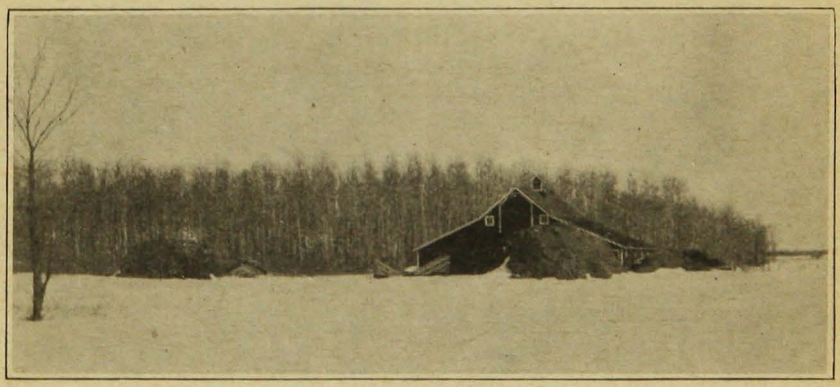
If the conditions which the trees have to face in the field are not unusually severe, they will be ready to plant out in the permanent site in the spring. Sometimes, when extra large stock is necessary, they can be left in the transplant bed for two years. They can be taken up, or "raised," best with a spading fork or spade. Care should be taken to dig deep enough and to break up the ground thoroly enough to keep from breaking off the small roots from the plant. Those small roots are absolutely necessary to its future success. As they are taken carefully from the ground, they should be placed immediately in a bucket of water and heeled in or taken directly to the planting site, if convenient. The handling is then precisely the same as for the transplants from the nursery. This plan will produce good planting-stock at a comparatively small expenditure of time and money.

In planting any class of stock, a small number should be kept in reserve in the garden or some other convenient place to replace the possible dead ones the next spring.

Cultivation.—Every plantation, no matter what the species or class of stock used, should be thoroly cultivated as long as it is practicable to do so. The trees may live without it, but it will do much to assure their success and will very often double their rate of growth.

Protection.—Every plantation should be carefully guarded against fire. All young trees are very readily killed by fire and their death means a set back of several years, at least.





Which Do You Prefer?

Value of a plantation.—It is unnecessary to explain the value of a plantation in a prairie country. The benefits received in the form of protection to home, orchard, and stock are too well known. The continuous strain of the howling wind and flying dirt around the unprotected house is very trying. That can all be changed in a very few years whenever the farmers will stop mourning the impossibility of growing trees and make the very slight effort necessary to secure them. The man who allows the wind to drive him from his prairie home is his own persecutor, for the remedy is easily within his reach.